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ABSTRACT

Thirty-four fourth-grade students participated in a study of the way in which children acquire frameworks used to recall and encode stories. The study tested the hypotheses that children have a consistent preference for a story structure node in which they identify narrative events as comprising plausible story themes, that the framework generated and used by children is consistent across stories, and that children will employ the same framework as an aid in their free recall of a story and in answering cued-recall questions about it. A story from a fourth-grade social studies text was rewritten into four smaller stories following different episodic parts of the original story. All subjects read each story and then wrote everything they could recall about it, using exact words when possible. They then completed a cued-recall test. Eight days later they were asked to recall as much as they could about all four stories. All three hypotheses were supported by the data. (A copy of one story used in the study is appended.) (TJ)

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Fourth Graders' Comprehension of Story Structures Under Three Recall Conditions

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Recent research on adult discourse processing has demonstrated that insofar as adults are able to identify a particular organizational framework for a given text type, they use this framework to encode and recall information from that text. Unfortunately, the question of how such a framework is developmentally acquired has received little attention. This is especially true in terms of how children acquire frameworks used to encode and recall stories.

The early work of Piaget (1926) and Fraisse (1963) suggested that young children lack a framework for organizing the events of a story. Piaget (1926) arrived at this conclusion by observing that children's recall fails to respect temporal order, confuses cause and effect relations, is less complete than adult recall, and suffers from the egocentric use of pronouns (i.e., it

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is unclear in the recall of protocols who is doing what to whom). Fraisse (1963) similarly reported that young children jumble the correct sequence of events when retelling stories.

Both Piaget and Fraisse assumed that the temporal inversions found in young children's recall resulted from an inability to establish a framework for organizing chronological, causal, and deductive relations. This assumption, however, has recently been challenged. In one study, Brown (1975) tested kindergarten and second-grade children's recognition, reconstruction, and recall of simple narrative sequences. For all children, logical sequences were better retained than were arbitrary sequences. The difference between the two groups was that although kindergarten children could recognize and reconstruct the correct sequences, they had difficulty in maintaining the correct order during recall. Second-grade children, on the other hand, were able to establish the correct order of the events no matter what the method of testing was.

In another experiment, Brown (1976) required children, preschool through fourth grade, to reconstruct a series of theme-related pictures. Children selected old items from a set containing actually seen items and two types of new items, those consistent or inconsistent with the ordered sequence of the story. Older children were found to be more efficient at adopting a consistent choice strategy, at rejecting inconsistent items, and at retaining the beginning or final items of the story. When performance on the old-beginning items was excluded, however, all grades had difficulty distinguishing the new-consistent items form the actually experienced old items.

In light of Brown's findings, a plausible model of how children comprehend stories is as follows. First, children identify an event within a narrative-event story structure as

being the plausible theme of the story. The term "narrative-event story structure" is used here to refer to those elements of a story which render the sequence of actions coherent and purposeful. According to Mandler and Johnson's (1977) story grammar, narrative event story structures would include such story-grammar tree-structure nodes as setting, beginning, complex reaction, goal path, and ending. Second, once a plausible theme has been identified, children then generate a plausible story framework around this theme. "Story framework" is used in this study to refer to the final sequence of linked story structure nodes. Finally, the chronological, causal, and spatial events of the story are then related to one another in the context of this framework. In instances where children are unable to identify narrative events as themes, the relations among the chronological, causal, and spatial events are difficult to perceive, and these events tend to be recalled randomly.

This model, in relation to Brown's (1975, 1976) work, suggests several significant hypotheses concerning the nature of the framework with which children encode and recall stories. First, Brown found that fourth graders tend to identify the initial narrative event as comprising the theme of the story. This finding has further been corroborated by Mandler and Johnson (1977), who found that fourth graders are most likely to recall events from the setting, or the initial narrative-event story structure. These findings suggest that children's selection of narrative events as candidates for themes, at the time of encoding, is not random. On the contrary, children's selection of such events appears to be consistent with respect to a particular narrative-event story structure, such as the setting. Another way of stating this hypothesis is that children have a consistent preference for a given story structure node in

which they identify narrative events as comprising plausible story themes.

A second hypothesis stems from the first. The model proposes that how one generates and uses a story framework is contingent upon the story node one first selects in identifying a narrative event theme. Provided that text and context variables are held constant, this means that the type of story framework a child generates and utilizes should be consistent across stories.

A third prediction stems from Brown's (1975) observation that young children may fail to generate and/or utilize a functional story framework given a particular method of testing. It might be argued that the kindergarten children in Brown's experiment had failed to develop the ability to consistently generate and utilize the same story framework independent of the method of testing. On the other hand, second graders had developed this ability. A plausible hypothesis would thus be that by fourth grade, children have developed the ability to consistently generate and employ a given story framework and that this framework should appear operative whether a child recalls a story or answers cued-recall questions about this story. These three hypotheses are tested in the following experiment.

Method

Subjects. Thirty students were randomly selected from two fourth-grade classrooms in a large suburban school near Albany, New York. All subjects participating in this experiment could read and respond to the stimuli in the manner required.

Stimulus Materials. A story from a fourth-grade social studies text was rewritten into four smaller stories following four different episodic parts of the original story. Each of

the four stories was written to conform to the same story-grammar tree structures (see Fig. 1), following the grammar of Mandler and Johnson (1977). Each story structure consisted of four nodes: the setting, the beginning, the development, and an ending. There were three events in the setting, three in the beginning, four in the development, and one in the ending. Each event within and across all four stories consisted of eleven propositions (as defined by Kintsch, 1974). The words in the propositions within and across all four stories were controlled for in terms of frequency (Kučera & Francis, 1967) and imagery value (Paivio, Yuille, & Madigan, 1968). The first story is presented in Appendix 1.

Procedure. The thirty subjects read each of the four stories. After reading a story, each subject was first required to write all that he could remember about the story. After the written recall, each subject attempted to complete a cued recall test. This test required that the subject fill in deleted information in eleven statements. Each of the statements corresponded to information in each of the eleven events in a story, respectively. The subjects read and completed the free and recall tests in one week. Eight days later the subjects were asked to recall as much as they could about all four stories. The subjects were tested in two groups, with each group receiving similar instructions. All subjects were told that they should carefully read the story, since they would be asked to write about each story and answer several questions. Moreover, all subjects were informed that they would be asked to write about the story one week later. Instructions for the free recall were, "Write everything you can remember about the story you have just read. Try to remember everything, including the words the author used." For the delayed recall, subjects were instructed

to "Write everything you can remember about the four stories you read last week. Try to remember everything, including the words that were in the story."

Scoring procedures. Responses to the free and cued recall tasks were marked by two raters. Acceptable responses included propositions which were literal reproductions from the text stimuli or else were synonymous with predefined text propositions. In the immediate free recall, four scores were tallied for each story. These scores included the number of propositions recalled in the setting, the beginning, the development, and the ending. Similarly, in the immediate cued recall, the number of propositions correctly recalled from the setting, beginning, development, and ending were likewise tallied. In the delayed recall, the number of propositions correctly recalled from each of the four nodes from each of the four stories was also tallied.

Results

In the following analyses, in order to compensate for the fact that some story nodes had more events and propositions associated with them, recall and recognition were figued in terms of the mean proportion of propositions recalled and recognized per node. The mean proportion of propositions recalled per node was calculated by multiplying the number of events per node times the number of propositions per event and dividing this product into the number of propositions recalled per node. In determining mean proportion of propositions per node, the number of cued recall questions correctly answered was divided by the number of events per node.

The first hypothesis stated that children are consistent in the story-structure node they select in which narrative events are identified as comprising plausible story themes. For this hypothesis to be verified, narrative events from one

node should have been consistently recalled more frequently than any other node over the four stories. An analysis of variance of the mean proporition of propositions in basic story nodes recalled immediately after reading the text (see Fig. 2) supports this hypothesis: $F(3, 116)=19.11$, $p < .01$. No interactions proved significant. This hypothesis is further supported by a series of Scheffé pairwise comparisons between the Setting and the other nodes within the stories; all Scheffés were significant except for the pairwise comparison between the Setting and the Beginning in Story 2.

The second hypothesis posited that the story framework a child generates and uses is consistent across stories. This hypothesis is supported both by an analysis of the mean proportion of propositions immediately recalled (see Fig. 2) and recalled a week later (see Fig. 3). If children produce and use a consistent story framework at the time of encoding, one would expect that in immediate recall, story nodes would be recalled equally well, relative to one another, across story recalls. An additional series of Scheffé pairwise comparisons between story nodes within stories in Fig. 2, all proved significant except between the Beginning and the Development in Story 1. This finding suggests that fourth graders construct a serially ordered framework for stories, identifying a theme in the setting node and progressively elaborating upon this theme by linking setting events with beginning events. This elaboration decreases across development and is quite minimal by the time the child reaches the ending.

This framework for story recall is further demonstrated in the delay recall (see Fig 3). An analysis of variance in this condition suggests significant differences between story

nodes across stories: $F(3, 110)=11.8$, $p < .01$. No interactions proved significant. A series of Scheffé pairwise comparisons proved significant between all the story nodes in Story 1. In Stories 2, 3, and 4, the only significant comparisons were between the Setting and the other story nodes. This provides additional evidence that the setting is the preferred node in which themes are consistently identified. Given that when one combines the four stories into an overall story structure and the first story becomes the setting for the new story, it is thus logical that the framework for the first story is better maintained than in the other three stories, which, in turn, comprise the beginning, development, and ending of the new story respectively.

The third prediction was that children would employ the same story framework as an aid in answering cued recall questions as well as in their free recall of the story. This again is demonstrated by the fact that an overall analysis of variance of the mean proportion of cued recall statements correctly answered (see Fig. 4) is significant: $F(3, 110)=17.7$, $p < .01$. No interactions proved significant. A series of Scheffés proved significant for all pairwise comparisons, except between the Setting and the Beginning in Story 2 and between the Beginning and the Development in Story 3 and 4. The fact that the framework in the immediate and delayed recall conditions thus supports the contention that children, by fourth grade, generate and utilize a consistent framework for comprehending stories under several test conditions.

Discussion

The findings of this study support the contention that by fourth grade children have developed knowledge of story structure

and they consistently use this knowledge in immediate free and cued recall and in delayed recall of particular stories. In light of other studies (cf. Meyer, 1977a, b), it can be argued that the consistent strategy selection employed by children in this study was largely a function of the consistent hierarchical structure of all four stories. In short, the pattern of specific story nodes at the top level of the story structure appears to dictate what top-level information will be remembered by fourth graders.

Spiro (1977) has criticized such studies as the preceding on the grounds that the accuracy of recall and the superior recall of high structure information result from the artificial situation of the recall experiment. He has argued that the subject's goal for recalling information in the experimental situation is quite different from the subject's goal of recalling information in real life. In the experimental situation, a person usually attempts to remember as much as possible about an experimental passage; what a person remembers in this situation is usually dictated by the structure inherent in the discourse. On the other hand, in real conversations, a person will remember aspects of discourse that are particularly interesting to him; what a person remembers in this situation is usually dictated by a person's perceived need to update his present information.

These authors would agree with Spiro that the recall experiment encourages subjects to select a strategy to accurately remember the story. However, both reasons for comprehending appear to be valid; one reads and listens not only for gratification of self interest, but also to be able to function in society, e.g. filling out forms and the critical reading of such things as contracts. Given this, a logical approach to researching

comprehension of discourse would thus be to first determine how content structure influences memory structure in the experimental situation. This situation would reveal whether children of a given age level have, in fact, developed knowledge of story structure frameworks. A second step would then be to gradually modify several discourse variables, e.g. the social situation of the experiment and the level of content familiarity, to see how recall of discourse structures are subsequently modified.

The present experiment serves as the first stage of determining fourth-graders' comprehension framework for stories. Additional experiments now need to be conducted to determine how this framework will vary, given different linguistic and paralinguistic situations. In brief, the question of how children learn to deal with these additional variables in their comprehension routines of stories needs to be investigated.

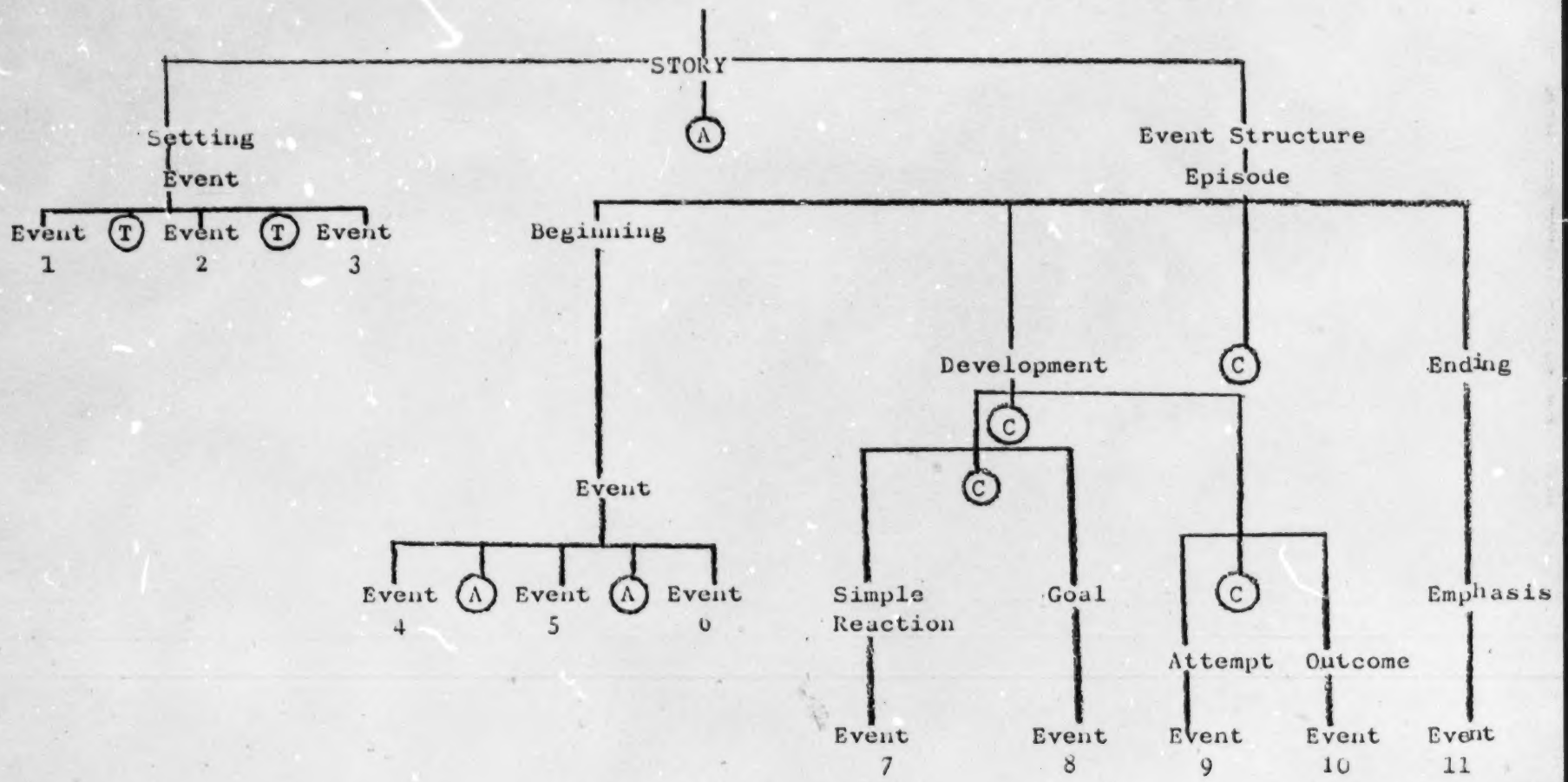

Fig. 1. Story-grammar tree structure of each of the four story stimuli.

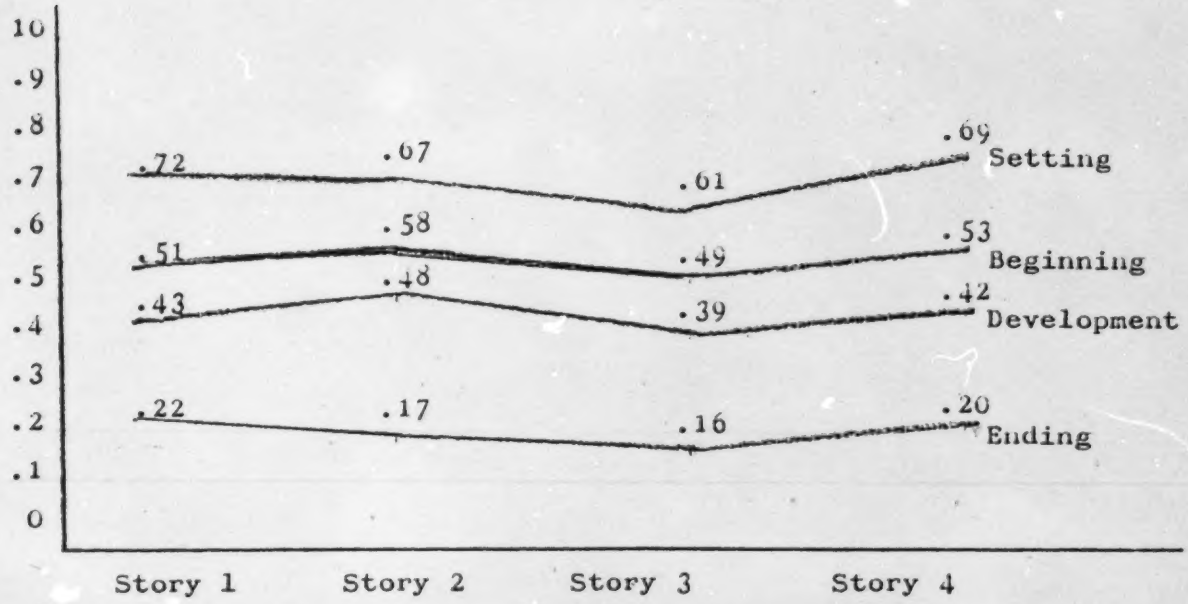

Fig. 2. Mean proportion of propositions in basic nodes immediately recalled by fourth graders over four stories.

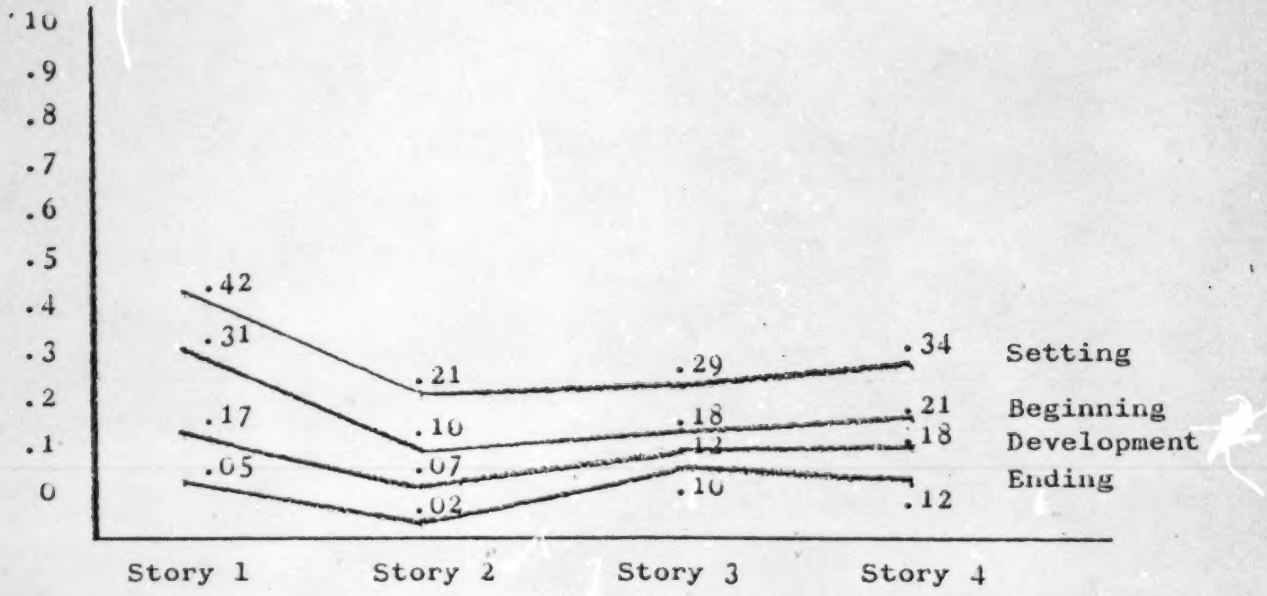

Fig. 3. Mean proportion of propositions in basic nodes recalled in delayed condition by fourth graders over four stories.

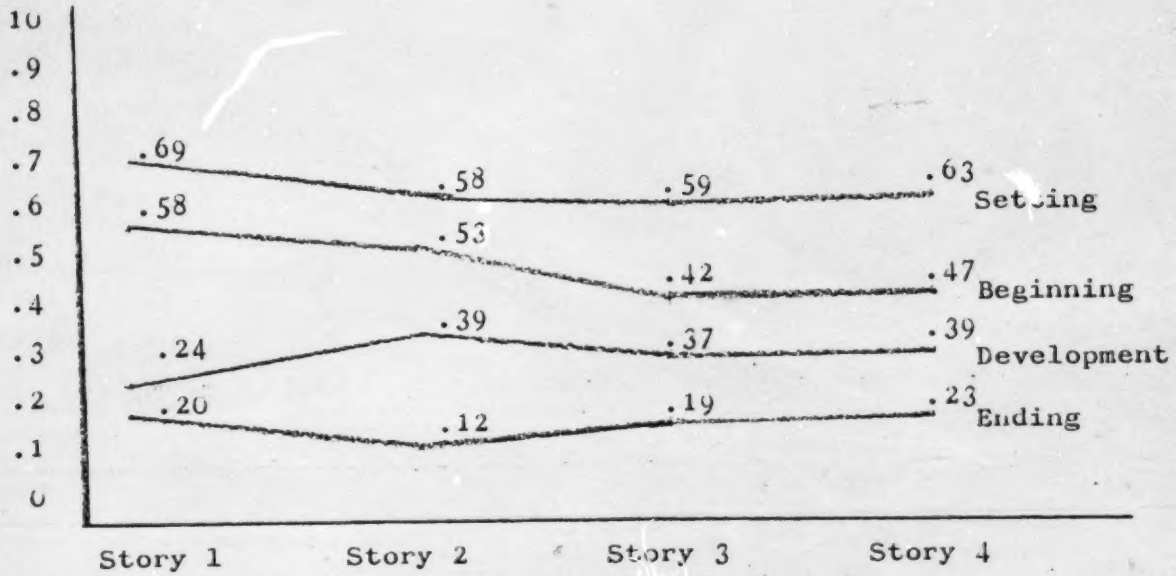

Fig. 4. Mean proportion of cued recall questions correctly answered in basic nodes.

Appendix 1

STORY 1

Event 1: Jacob Riis arrived in New York City on a warm spring morning in 1870. Riis was twenty-one years old and had come from Denmark to the United States to seek his fortune.

Event 2: Riis thought about his future as he looked over the railing of the docking ship. In this great city of New York, Riis hoped to find a job and live a happy life.

Event 3: After four days, Jacob Riis had found no job. With forty dollars in his pocket, he left New York City to find a job in Pennsylvania. He was unsuccessful and returned to New York City.

Event 4: Since Riis had no job or money, he lived like the poor people. On cold nights, Riis slept in free sleeping rooms, which were dirty and smelly.

Event 5: One night, Riis walked into a police station. He was hungry, tired, and dirty. He asked a policeman for a place to sleep. Riis was shoved by the policeman into a room.

Event 6: Riis yelled at the policeman, saying the policeman had no right to push him around just because he was poor and wore torn clothing. Riis cried that poor people had rights, too.

Event 7: Riis found himself lying in a room crowded with people. Riis found that the room smelled so badly that he could hardly sleep. But at least Riis was warm.

Event 8: Before falling asleep, Riis made himself as comfortable as possible. He pulled his ragged coat collar up around his ears. He pulled his hat down to cover his eyes. He rubbed his hands together to warm them.

Event 9: Suddenly Riis felt a sharp pain. He jumped to his feet in surprise. He had been bitten by something. He began looking in a corner to find what had bitten him.

Event 10: In lifting up a broken board, Riis found a huge rat. Riis took off his shoe and hit the rat has hard as he could. Riis took the dead rat outside and dumped it in the garbage.

State 11: Riis was too angry to sleep any more that night. He was mad that he and other people had to live as poor human beings. He swore that he would change things.

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